

MTRR A66G POLYMORPHISM

ORDERING INFORMATION

REF: GEN-027-25 RDM Code: 2257737/R
Tests: 25 Reactions: 31
REF: GEN-027-50 RDM Code: 2159830/R
Tests: 50 Reactions: 62
CND Code: W0106010499
Manufacturer: BioMol Laboratories s.r.l.

CONTENTS OF THE KIT

The kit consists of reagents for Real-Time PCR amplification
*reagents for the extraction of genomic DNA are not supplied in the kit

For in vitro diagnostic use



PRODUCT CHARACTERISTICS

Device belonging to the family of in vitro medical devices **REAL-TIME QUALITATIVE PCR -GENETIC VARIANTS**. Detection of A66G polymorphism of the MTRR gene by Real-Time PCR technique. Optimized kit for Real-Time PCR instrumentation Biorad CFX96 Dx, Biorad Opus Dx, Agilent AriaDx.

SCIENTIFIC BACKGROUND

Although there is a correlation between HHcy and MetS, the mechanisms are still unclear and that is why many researchers have proposed several theories including promotion of endothelial dysfunction, induction of insulin resistance, and DNA methylation status. Consequently, both DNA methylation and DNA synthesis can be altered by interaction with homocysteine, vitamin B12, and folate.

The MTRR A66G polymorphism appears to be associated with an increased risk of MetS only when combined with the MTHFR 677TT genotype. In fact, the combined TT/GG, TT/AG and TT/AA genotypes confer a greater risk of MetS compared to the MTHFR C677T mutant genotypes alone.

Although no association was found between MetS and the MTRR A66G polymorphism alone, the MTRR 66GG genotype was associated with high fasting blood glucose values and high triglyceride levels although these results need to be confirmed with further studies given the relatively frequent low of the MTRR 66GG genotype in many populations.

§ Association of MTR A2756G and MTRR A66G Polymorphisms with Male Infertility: An Updated Meta-Analysis. Am J Mens Health 2023 May-Jun;17(3):15579883231176657.

§ Du B, Tian H, Tian D, Zhang C, Wang W, Wang L, et al. Genetic polymorphisms of key enzymes in folate metabolism affect the efficacy of folate therapy in patients with hyperhomocysteinemia. Br J Nutr. 2018; 119(8): 887-895

§ Kuzawski M, Wajda A, Malinowski D, Kozienko A, Kurzawa R, Drozdziak M. Association study of folate-related enzymes (MTHFR, MTR, MTRR) genetic variants with non-obstructive male infertility in a Polish population. Genet Mol Biol. 2015; 38(1): 42-47

§ Yang B, Fan S, Zhi X, Wang D, Li Y, Wang Y, et al. Associations of MTHFR C677T and MTRR A66G gene polymorphisms with metabolic syndrome: a case-control study in Northern China. Int J Mol Sci. 2014; 15(12): 21687-21702

§ Jiang, S.; Zhao, R.; Pan, M.; Venners, S.A.; Zhong, G.; Hsu, Y.H. Associations of MTHFR and MTRR Polymorphisms with serum lipid levels in Chinese hypertensive patients. Clin. Appl. Thromb. most. 2014, 4, 200-210.

§ Jacques, P.F.; Boston, A.G.; Selhub, J.; Rich, S.; Ellison, R.C.; Eckfeldt, J.H.; Gravel, R.A.; Rozen, R.; National Heart, Lung, Blood Institute; et al. Effects of polymorphisms of methionine synthase and methionine synthase reductase on total plasma homocysteine in the NHLBI Family Heart Study. Atherosclerosis 2003, 166, 49-55 elevated levels of triglycerides even if these results need to be confirmed with further studies given the relatively low frequency of the MTRR 66GG genotype in many populations.

CLINICAL SIGNIFICANCE

Methionine synthase reductase (MTRR) plays a key role in folate metabolism, in interconnection with the enzyme 5,10-methylenetetrahydrofolate reductase (MTHFR). MTHFR catalyzes the regulation of cellular methylation through the conversion of 5, 10-methylene tetrahydrofolate (THF) to 5-methyl-THF, the major circulating form of folate metabolism. MTRR, on the other hand, is required for the reductive methylation of vitamin B12, also known as cobalamin, an activated cofactor for methionine synthase (MTR), which catalyzes the methylation of homocysteine to methionine.

The methionine synthase reductase (MTRR) gene is located on chromosome 5 and plays a critical role in DNA synthesis.

The A66G polymorphism has been described for the MTRR gene, resulting in a substitution of the amino acid methionine to isoleucine at codon 22 (M22I).

This MTRR 66A>G polymorphism would also appear to be involved in the conversion of homocysteine into methionine, which negatively influences enzymatic activity and is therefore considered a genetic risk factor for hyperhomocysteinemia (HHcy). MTRR A66G can also induce DNA hypomethylation by regulating homocysteine levels. Homocysteine plays a role in the development of metabolic syndrome (MetS). MetS is caused by the interaction of multiple genetic and environmental factors.



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DESCRIPTION	LABEL	VOLUME		STORAGE
		GEN-027-25	GEN-027-50	
Mix oligonucleotides and probes	Mix A66G MTRR 10X	1 x 77,5 µl	2 x 77,5 µl	-20°C
Mix buffer and Taq polymerase enzyme	Mix Real-Time PCR 2X	1 x 387,5 µl	2 x 387,5 µl	-20°C
Deionized H ₂ O	Deionized H ₂ O	1 x 1 ml	1 x 1 ml	-20°C
Genomic DNA or recombinant DNA	Control 1	1 x 22 µl	2 x 22 µl	-20°C
Genomic DNA or recombinant DNA	Control 2	1 x 22 µl	2 x 22 µl	-20°C
Genomic DNA or recombinant DNA	Control 3	1 x 22 µl	2 x 22 µl	-20°C

TECHNICAL CHARACTERISTICS

COD. GEN-027-25 / COD. GEN-027-50

STABILITY	18 months
REAGENTS STATUS	Ready to use
BIOLOGICAL MATRIX	Genomic DNA extracted from whole blood, tissue, cells
POSITIVE CONTROLS	Recombinant DNA for at least 3 analytical sessions (GEN-027-25) Recombinant DNA for at least 6 analytical sessions (GEN-027-50)
VALIDATED INSTRUMENTS	Biorad CFX96 Dx, Biorad Opus Dx and Agilent AriaDx
TECHNOLOGY	Real-time PCR; oligonucleotides and specific probes; 2 FAM/HEX fluorescence channels
RUNNING TIME	85 min
THERMAL CYCLING PROFILE	1 cycle at 95 °C (10 min); 45 cycles at 95 °C (15 sec) + 60 °C (60 sec)
ANALYTICAL SPECIFICITY	Absence of non-specific pairings of oligonucleotides and probes; absence of cross-reactivity
LIMIT OF DETECTION (LOD)	≥ 0,016 ng of genomic DNA
LIMIT OF BLANK (LOB)	0% NCN
REPRODUCIBILITY	99,9%
DIAGNOSTIC SPECIFICITY / DIAGNOSTIC SENSITIVITY	100%/98%